USAWC STRATEGY RESEARCH PROJECT

NETWORK CENTRIC WARFARE: DOES FUNDING PRIORITIES SUPPORT THE STRATEGY?

by

Colonel Robbie L. Mosley
United States Army

Doctor Jeffrey L. Groh
Project Adviser

This SRP is submitted in partial fulfillment of the requirements of the Master of Strategic Studies Degree. The U.S. Army War College is accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools, 3624 Market Street, Philadelphia, PA 19104, (215) 662-5606. The Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation.

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
15 MAR 2006		

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Network Centric Warfare Does Funding Priorities Support the Strategy?	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Robbie Mosley	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
U.S. Army War College,Carlisle Barracks,Carlisle,PA,17013-5050	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT
See attached.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**		**24**	

ABSTRACT

AUTHOR: Colonel Robbie L. Mosley

TITLE: Network Centric Warfare: Does Funding Priorities Support The Strategy?

FORMAT: Strategy Research Project

DATE: 15 March 2006 WORD COUNT: 5,845 PAGES: 23

KEY TERMS: Future Combat System, Budget; Transformation

CLASSIFICATION: Unclassified

Network Centric Warfare is a central component of the Defense Department's transformation initiatives. It continues the journey of transforming the military services into joint, capabilities-based formations for meeting the challenges of the 21st Century. The following analysis provides a microscopic slice of the Defense Department's transformational concepts for the military. The Army's Future Combat System serves as an excellent case study for reviewing some key elements of defense transformation and the feasibility of funding network centric operations. This paper examines issues with the processes for obtaining the necessary resources to include the complexities of transforming a military service. Finally, the paper provides recommendations on ensuring the successful implementation of the transformation objectives. While the Military Departments are updating their operational constructs toward Network Centric Warfare Vision, the funding debates reflect a significant gap in obtaining the necessary resources for full implementation. In essence, Network Centric Warfare is struggling for valuable resources and may falter due to the de-synchronization of intra-dependent programs.

NETWORK CENTRIC WARFARE: DOES FUNDING PRIORITIES SUPPORT THE STRATEGY?

Over the past several decades, America's military forces served as a critical element of national power in both domestic and international environments. Combined with the other national elements of power (information, diplomatic, law enforcement, intelligence, finance and economic), the United States Military oversaw the successful collapse of the Soviet Union, the dawning of the post-Cold War era and establishment of the United States of America as the sole superpower. With unparallel dominance, America's military strength provoked debates on its role, function, size and price tag within the global security environment. Seeking to maintain their over-matched capabilities into the future, the military services embarked on various transformational paths to ensure their relevance as part of America's military power. The sum of those paths focused on a new way of thinking about military operations- Network Centric Warfare. This new lens of considering battlespace entities extended beyond technology and into an emerging military response as part of the Information Age.[1]

Network Centric Warfare became the military's systemic approach toward the Defense Department's transformation initiatives. This concept seeks to unify the journey of changing the military services into joint, capabilities-based formations for meeting the security challenges of the 21st Century. The goal was the development of a single strategy across the military institutions for unity of effort. Additionally, this single strategy sought defusing any debate with regards to the military's status in new security environment. While the Military Departments updated their operational constructs toward the Network Centric Warfare Vision and maintained focus on the current operational needs, funding becomes potential obstacles on all fronts. The funding concern, to include the rising national debt, reflects the reality of limited resources and the methodology for obtaining resources. As a result, Network Centric Warfare is struggling for valuable resources and may falter due to the de-synchronization of intra-dependent programs.

Network Centric Warfare entails several major acquisition programs with transformation technology. The following analysis provides a microscopic slice of the Defense Department's transformational concepts for the military. The Army's Future Combat System serves as an excellent case study for reviewing some key elements of defense transformation and the feasibility of funding network centric operations. This paper examines issues with the processes for obtaining the necessary resources to include the complexities of transforming a military service. Finally, the paper provides recommendations on ensuring the successful implementation of the transformation objectives.

With the arrival of the Bush Administration in 2000, the Secretary of Defense embarked on 'transformational' changes across the Department of Defense. While the military services were in the process of making internal modifications to their post-Cold War era concepts and platforms, their plans were not directly synchronized with the envisioned transformational goals[2] of Defense Department's leadership. Transformation sought changing the status quo to ensure military relevance into the future. Additionally, transformation focused on making significant changes the overall culture of the U.S. Armed Forces.[3] President George W. Bush codified transforming the military institutions for meeting the challenges and opportunities of the 21st Century in the National Security Strategy of the United States, dated September 2002.[4] Transformation brought new meaning and focus across the Department of Defense, to include the development of a defense-wide Transformation Roadmap and potential shifting of resources to support the Secretary of Defense's concept.

> Transformation is foremost a continuing process. It does not have an end point. Transformation is meant to create or anticipate the future. Transformation is meant to deal with the co-evolution of concepts, processes, organizations and technology. Change in any one of these areas necessitates change in all. Transformation is meant to create new competitive areas and competencies. Transformation is meant to identify and leverage new sources of power. The overall objective of these changes is simply- sustained American competitive advantage in warfare.[5]

The formulation of the transformation concept into the national strategy sealed its legitimacy and influence on the Military Department's budgetary process. Yet, the Defense Departments must move beyond the synchronization of independent programs with roadmaps into a central strategy of one roadmap.

Future Combat System: A Case Study on Transformation

As previously noted, the Army's Future Combat System provides a sterling example to review the complexities of transformation/network centric warfare. With an estimate cost of over $160 billion[6] and potential to dominate the Army's investment accounts over the next decade[7], this multiyear, multibillion dollar program is the most expensive acquisition endeavor in Army's history. The Future Combat System is more than a single program. It employs a system-of-system of several components intertwined into one umbrella. The program influences more than the procurement of technologies or the modernization of legacy equipment. As the centerpiece for transformation within the United States Army, the Future Combat System is creating significant changes in the force structure, organizational design and operational concepts of the Army. To achieve this vision, the Army is moving toward brigade-sized combat

units equipped with advanced combat equipment. The design accommodates fewer people and vehicles, is lighter and more rapidly deployable and operates without the heavy logistics and support footprint of traditional brigades. Additionally, the Army is shedding the divisional construct for independent maneuver on the battlefield based on the sophistication and effectiveness of the network.[8]

In 1999, Chief of Staff of the Army General Eric Shinseki officially embarked on a mission of transforming all Army divisions into Objective Force. The schedule projected the first operational unit in 2011 and the entire transformation of the Army by 2032. However, the concept got its first major adjustment with the new Chief of Staff of the Army General Peter Schoomaker in 2003. The re-designation of the Objective Force as the Future Force and emphasized a faster fielding of capabilities.[9]

While the Future Combat System is the Army's 'premier' technological solution towards transformation, its 18 subsystems (unattended ground sensors; two unattended munitions; four classes of unmanned aerial vehicles; three classes of unmanned ground vehicles; and, eight manned vehicles) [10] and the network are competing amongst each other for appropriated dollars from Congress. While a multitude of influences exist in regards to cost factors for the Future Combat System program, this paper reviews two factors that drive operating and sustainment costs for transformational forces as noted in a study by the Institute for Defense Analyses. The potential key factors, based on the unit of action concept[11], are maintaining a high availability rate for combat vehicles and operating and maintaining the proposed Mobile Ad Hoc Network. The reliability of the combat platforms and the connectivity to the mobile network are critical features for the effectiveness and survival of the brigade-sized unit on the battlefield.[12]

The Future Combat System Operational Requirements Document[13] provides the operational availability requirement for the vehicle platform: each variant within a unit must achieve an operational availability of 95 percent (threshold) and 99 percent (objective) measured continuously during a mission pulse.[14] This requirement illustrates the major objective of reliability for Future Combat Systems. To achieving this availability level, the Future Combat System manned ground vehicles may fall within a mean time between systems aborts (MTBSA) range of 741 hours (non-line-of-sight cannon) to 2,733 hours (medical vehicle). In the same vein, the Stryker Infantry Carrier Vehicle and Mounted Combat System require mean time between system aborts of 2,364 and 1,148 respectively. A relative comparison of the Stryker Infantry Carrier Vehicle resulted in a mean time between system aborts of 167 hours, roughly 7 days. With a mean time of repair of about two days, the vehicle reliability reaches 95 percent.

Currently, the Future Combat System vehicle reliability requires significant improvements beyond today's military platforms.

The study suggests four strategies for increasing the availability rate: improve part life, reduce administrative and logistics down time, perform frequent overhauls and prognostics. Accomplishing the reliability requirement, the Army could seek the employment of smaller logistical footprint which leads to fewer logistical personnel, spare parts and vehicles for storage and transportation needs in the battle space. Conversely, a failure in meeting the availability criteria and using current levels of availability for vehicles leads to more logistical personnel, spare parts and vehicles.[15] This equates to increase cost for vehicle sustainment and personnel overhead, which contradicts the Army's focus of a smaller combat force and logistical footprint.

The next potential cost driver and biggest challenge is the networked capabilities supporting the Future Combat System. The primary high-risk cost drivers are hardware, software and support (logistics and personnel). Along with the previous discussion of platform maintenance, the hardware cost for electronics and computers will generate additional operating and support cost. With the continuing maturity of antenna technology and the inability to conduct valid engineering and testing, there is not realistic estimate to anticipate down time, spare parts for modified antenna components or reducing problems like co-site interference. On the other hand, the rapid pace of computer technology creates obsolescence and upgrade cost in comparison with historical averages for non-computer-based systems.

As a technology-driven program, this ripple continues into the development of software. Based on the myriad of Future Combat System requirements, it will require an order of magnitude more lines of code than any known program within the Defense Department. The complexity and interoperability of linking many diverse subsystems leads to a high risk of large, non-linear cost growth and beyond those of past systems.[16] This fact was acknowledged in an independent assessment panel conclusion that "software development is judged to be the greatest cost and schedule risk to the program."[17] Additionally, the interoperability requirement suggests over a million source line of code based on a simple order-of magnitude estimate and an increase in the total life-cycle costs.[18] Again, this raises the potential risk for increased operating and support cost based on the projection of 50 percent to 75 percent of total software life-cycle costs.[19]

The other significant cost driver, in ensuring the mobile networking capabilities for the Future Combat System program, is the personnel and logistical support based on the system's technical demands. Embracing the network-centric nature of the future operational environment, all personnel will require extensive hours of training for both operators and

technicians. The cutting-edge nature of the technology implies the need for continuous specialized training based on the upgrading of software throughout the system.[20] This is another area for potential increase in cost. Table 1 provides some generic cost comparison based on the high availability levels and reflects the above discussion points.[21] For a truly robust network along with the technical advances of the Future Combat System program, the manpower, parts, software and training cost may exceed current forecast estimates and cause continue reviews of the strategy for the necessary funding.

Data Description	ACR Baseline	SIB(MX) Baseline	Stryker Brigade Baseline	UA Baseline
Number of Combat Units	10	10	11	8
Number of People	4983	4388	3498	2540
Major Equipment Count	596	433	341	322
Total Military Personnel Cost (FY04$M)	263.7	227.3	181.9	142
Total O&S Cost (FY04$M)	443.5	338.3	270.6	193.5
Total Ground Vehicle Direct Material Cost (FY04$M)	64.9	35.1	27.5	15.2
O&S Cost/Person (FY04$K)	65.9	59.8	59.9	61.9
O&M Cost/Person (FY04$K)	13	8	7.9	6
Military Personnel Cost/Person (FY04$K)	52.9	51.8	52	55.9

TABLE 1. UNIT OF ACTION COMPARISON

As the Army seeks to modernize and transform, some estimates include a sustained increment of $10 billion beyond its average post-Cold War expenditures for the Future Combat System- alone.[22] Essentially, the long-term commitment of funding presents many obstacles toward the fielding and implementation of the Future Combat System program. Since inception, the program highlights the competing and mutually supported funding requirements toward modernization, military transformation and the current operational requirements. The reliance on information dominance, based on sharing of information, and the reduction of force protection to include less armor vehicles reflect the subtleness of transformational changes into the military. Interestingly, this subtle change manufactures major re-prioritization for fielding a military force.[23] Hence, this competition for funding includes the other programs across the government and the modernization of current systems.

Of course, these issues reflect past experiences for the United States Army or the Department of Defense. The same dilemma existed with the Army's digitization effort. While the Army did obtain some critical digitized capabilities, such as the Force XXI Battle Command, Brigade and Below (FBCB2) system, the realization of fully digitized divisions and corps was

beyond the available resources. The challenge was daunting as the Army sought $260 million for unfunded digitization requirements in FY1999 to avoid raiding modernization accounts or delay the fielding. Despite earmarking over $14.7 billion across the 2000-2005 program objective memorandum and establishment of the Army Digitization Office to synchronize the effort[24], the growing price tag proved too costly for the Army. So, the simple question is will history repeating itself with a new name- the Future Combat System.

The Future Combat System underscores many digitization points due to funding concerns, shifting priorities and the maturity level of its emerging technologies. As stated in the Army Strategic Planning Guidance 2004[25], the Army developed a new vision and direction based on the security environment and the Global War on Terrorism. The additional emphasis created the shifting of funding priorities. Accordingly, the 2005 guidance did not alter the focus; but, it included additional concepts for maintaining the momentum of transformation and change.[26] Table 2 provides the latest research, development, testing and evaluation (RDT&E) projects for the Future Combat System program.[27] As the world does not stand still or potential threats to the United States ebb, the military services are in a yearly debate for their showing relevance in the current and future engagements. This equates to maintaining, if not increasing, their TOA in support of current operational missions, modernization efforts and investments into the future strategy/concept (i.e., transformation). Simply, funding drives the potential for successful implementation and shows commitment and dedication to the accomplishing the strategy.

Program Element	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11
Armored Systems Modernization (ASM)- Eng*	1715355	2268236	3065629	3150136	3128860	3058300	2950951	2600280
Non Line of Sight Launch System	0	55794	231554	329412	280225	261362	90950	18100
Non Line of Sight Launch Cannon	251344	476736	107587	262492	273226	140428	139569	72325
TOTAL	1966699	2800766	3404770	3742040	3682311	3460090	3181470	2690705

NOTES:
* includes the below programs:
FCS-RECON Platforms & Sensors
FCS-MANNED GROUND VEHICLES (UGV)
UNATTENDED SENSORS
SUSTAINMENT
MANNED GROUND VEHICLES
SoS ENGINEERING AND PROGRAM MANAGEMENT

TABLE 2. FCS REASEARCH, DEVELOPMENT, TEST AND EVALUATION FUNDING

Within the Department of Defense, there are no 'franchised' programs during the yearly budget reviews and congressional hearing. The dollars reflected in Table 2 beyond the current budgeting year are placeholders and subject to yearly modification. The past few years have highlighted this truism in many ways due to changing priorities and competing needs on the national treasure. The most recent is the tragic events called 9-11. On September 11, 2001, hi-jacked airplanes flying into buildings (World Trade Center and Pentagon) and crashing into an open Pennsylvanian field (as passengers prevented a third building attack) on American soil produced a high level of urgency pertaining to America's security and interests. As a result, the Bush Administration declared a 'Global War on Terrorism'.[28] Plus, the subsequent invasions of Afghanistan (Operation Enduring Freedom) and Iraq (Operation Iraqi Freedom) propelled the military into dealing with funding requirements on several fronts, to include transformation. Transformation, like other topics, remained a key goal, as noted by the Secretary of Defense:

> Our goal is not simply to fight and win wars; it is to try to prevent wars. To do so, we need to find ways to influence the decision-makers of potential adversaries, to deter them not only from using existing weapons, but to the extent possible, try to dissuade them from building dangerous new capabilities in the first place. Just as the existence of the U.S. Navy dissuades others from investing in competing navies- because it would truly cost them a fortune and would not succeed in providing the margin of military advantage- we must develop new capabilities that

> merely by our possessing them will dissuade adversaries from trying to compete.[29]

While the above shows the long-term competition for funds, the other red herring is daily operations and supplemental funding to prosecute the war on terrorism for the military element of power.

This additional drain of resource culminated with concerns on defense spending from both congressional leaders and the average American based on the rising national debt, the recent tragedies of Hurricanes Katrina and Rita and eroding public support for Operation Iraqi Freedom. With no increase in spending limits, the Defense Department faced an estimated $32 billion cut across the fiscal year 2007 to 2011 budget. The standard solution is across the board cuts within the Defense Department and includes the 'crown jewel of the services' modernization effort'- along with transformation programs.[30] As a result, the Army circled its wagon to protect the Future Combat System from potential cuts. This reflects an attempt to 'break the cycle of tapping service investment accounts to pay bills' and avoid the lost of another major program (i.e., Comanche, Wolverine and Crusader). As an alternative method of paying its bills, the Army seeks to jettison unit for paying its share of any defense bill.[31] Of course, this reduction of manpower/force structure requires balance and synchronization based on near-term and long-term requirements. The simple act of cutting a program causes second and third order effects beyond the 'visibility of dollar crunching' within a specific program. It ripples across the entire budgeting plans with long and short term impacts.

Consequently, the Army has restructured the Future Combat System. Beyond the sticker price of the system, the restructuring affects delivery timelines, force structure and modernization of other key programs. Seeking to maximum cost benefits for the Future Combat System, the Army's current focus is on 'spiraling higher payoff technologies' into its current force faster, enhance the capabilities of the current force and influence the development of the Future Force.[32] At the same time, the culture of the Army continues to evolve based on Cold War bureaucracy, lessons from current operations and the infusion of new technologies. The below comment from the Chief of Staff highlights the new focus:

> … you know we accelerated the FCS Program. Now, we say we accelerate it. What we are doing is spiraling maturing technologies out of the Future Combat Systems Program on to the current force... So as we can spiral technologies—and it's not just battle command, and it's not just digits. It's things like on the UAVS that we can tie down to tactical levels, for things like radios and common ground stations so that we can have better joint connectivity and nodes—'cause we do this. It enables our current force in ways that starts acting like the future modular force. And, therefore, we start organizing. We start developing the

> doctrine. We start training the soldiers and leaders to act like we want them to lead in this future force as part of the transformational path...[33]

This approach enables the Army to employ available parts of the Future Combat System to today's units, provide time for testing and development of the more challenging parts and effective manage the cost and technical risk of the program.[34]

The subprograms and network of the Future Combat System are significant acquisitions with developmental efforts in various congressional districts. Based on the interdependence of these transformation systems and political sensitivities of jobs in the defense industry, the disruption of one system may cause desynchronization of the entire program. Thus, the structure and programmatic constructs of the Future Combat System promotes a more holistic view of decisions in comparison to the traditional single big acquisition of singularly functional weapon system. As such, the use of the Future Combat System program highlights the difference of a single program approach instead of the current multi-program approach for military transformation. Notably, the Departments of the Navy and Air Force and other Department of Defense agencies can attest to similar concerns with their core network centric operation programs. At some point, the nation must maintain long-term continuity with in strategy and the necessary resources for implementation. This entails a detailed understanding of the effects and affects across the entire program- not just the procurement of technology.

Recommendations

Expanding the Future Combat System program's illustration into the overall transformation paradigm, the primary step is development of a funding plan for the long-term strategy of transformation- with minimum modifications during the yearly allocation of funding. 'A plan without resources is not a plan.' This adage creates significant hurdles in implementing any program and meeting the transformation concept, as evidenced in the termination of the Crusader, Wolverine and Comanche programs. In this author's view, it is imperative for Defense Department to address at least three areas toward a successful implementation of network centric warfare i.e., a subcomponent of the transformation strategy. Otherwise like the Army's digitization efforts, the acquisition of hardware for network centric warfare faces termination or delays during each yearly budgetary cycle. As with any complex system, the interwoven parts require balance application for seamless function as a whole. The adjustment of any one area, of the complex system, mandates a reactive correction for maintaining overall balance and efficient operations. Returning to the system thinking approach, the long-term requires orientation toward the systems viewpoint of understanding the relationship of each

component, delays and feedback loops. While fixing problems in a vacuum (independent elements) or for the short-term, they may return with haunting results to the holistic effort.[35] As such the primary areas for notable improvement are a portfolio management funding strategy, the total buy-in of the system (strategy) and articulation of strategy beyond the procurement of hardware. This section will review the aforementioned areas for improvement.

For a successful implementation of the Future Combat System, it requires a full funding and total commitment from the Army, Defense Department and Congress. While providing the strategic direction and expected cost, the Executive Branch (with the Defense Department lead) does not have the mission or authority to fund it. The Legislative Branch possesses this function.[36] This decentralization of power within America's political construct forces some agreement on national security initiatives. This process affects the substance of U.S. national security policy. Therefore, the Executive Branch commences in dialogue (or debates) with various congressional leaders (like the Senate and House Armed Services Committees) for building consensus and funding support of the 'defense plan'.[37] Through a series of budgetary sessions, the Legislative Branch (i.e., Congress) reviews, prods, and assesses the overall strategy. These sessions lead to concerns slightly motivated by political agendas and jobs for voters in congressional districts. While outside the scope of this paper, these concerns have a significant influence in the budgetary process to include the designation of individual programs in for scarce resources. In the end, the current funding decisions provide for pieces of the strategy- not the whole, as reflected in yearly defense budget.

Portfolio management funding strategy

The Defense Department has made minimum adjustments in its development of funding programs for the military services based on the Planning, Programming, Budgeting and Execution System (PPBES).[38] This process ballooned into a massive bureaucracy and played a critical role in supporting the emergence of America's military force. Thus, one of the main outcomes was on the procurement of 'things' based on the parochialism of the individual Services. The current military alignment and other major defense institutions were designed for the Cold War with different requirements and threats assessments. The new and unidentified threat requires a more flexibility, robust and adaptive construct. With innovation to change the conceptual processes of Cold War forces, the new mission highlights "developing the assets such as advanced remote sensing, long-range precision strike capabilities, and transformed maneuver and expeditionary forces"[39] and the beginning of a new era. The concept of transformation requires a re-tooling of the process along with the future procurement of joint

systems. With improvements in funding management, long-term funding and realistic estimates, the Department of Defense, along with congressional leaders, may lessen the disruption on long-term concepts based on funding near-term needs.

Returning to the case of the Future Combat System, the Army's effort focuses on future requirements for rapid deployment and maintaining its lethality in combat. With new technologies, this program promotes mobile formations, information sharing and the flexibility for employment across the spectrum of conflict for land-based operations.[40] However, the requirement to fund short-term needs places the Future Combat System into a yearly fight of maintaining its limited resources. Despite the counter-intuitive process, this stove-piped Cold War-centric application of the PPBES[41] remains the primary tool for funding a multi-faceted interdependent strategy. In an effort to work within the paradigm, the Army restructured the Future Combat System away from the classic large complex acquisition into a spiral approach. Simply, the Army changed its funding management of the Future Combat System.

This construct allows for subset delivery of the system in four spiral phases. Besides reducing the acquisition risk and cost, it provides more capability to the current force (short-term) and enables continued development for the Future Force (long-term).[42] Although the entire system requires eighteen subsystems coupled with the network and soldier, another examination of Table 2 reveals a systemic approach toward the core development of the Future Combat System. This model of funding limits the protectionism of the stove-pipe, singular procurement of thing and embraces a move toward portfolio management.[43] Using portfolio management, total system becomes the primary effort. Plus, it links the entire portfolio's entities with the vision, mission, goals and priorities for the desired capability of the overall system- not a stove-piped component.[44] Additionally, the complexities of one portfolio with another reaches a level of simplification and enables more insight into the overall balance of system from both internal and external environments. In essence, it informs the PPBES process of the consequences related to the yearly shifting resources with a system-of-system perspective in comparison to the stove-piped review of individual programs.

The final element in developing a valid funding strategy is realistic estimates. This activity requires the honest and realistic expectations of both the government and the defense industry. Since 2004, the Government Accountability Office and the numerous acquisition reports voiced concerns about a 63 percent increase in the program's cost.[45] Despite the debates from the government and the Future Combat System's contracting team, the independent assessment in Table 1 highlights a number of concerns for working toward a realistic estimate from the beginning of the program. Unfortunately, the Future Combat System, like other major

procurement program, are lacking in their initial cost estimation. Couple with program restructuring and technical challenges, the bottom line is increased cost and hard decisions on the affordability of the program. The current funding strategy of the Future Combat System (Table 2) reflects a more viable portfolio management concept and progress in the right direction for efficient program management.

Total buy-in of the system-of-system strategy

As for transformation, the Defense Department should provide a comprehensive plan to include the linkage of key programs and their interrelationships for accomplishment of the strategic plan. The following external factors are important contributors to the funding process and program management. First, the maturity of technology and industry's schedule performance are other key variables in the yearly review of programs. Additionally, the defense industry must provide reasonable cost estimates and forgo the current tendencies of increasing the price tag. Again, the Army's Future Combat System provides an excellent example of increasing cost at over $100 billion[46] and growing due to cost over runs and program delays. As a minimum, these concerns entail transparency, a good faith estimate and long-term support from the major players [i.e., the defense industry, congressmen and the Defense Department (to include the military services)]. Congress must provide the heavy hand in holding the defense industry accountable based on national interest and avoid the trappings of supporting industry efforts based on their constituency employment opportunities.

Based on the awareness of shortfalls within the overall Defense Department's FY2007 – FY2011 budget and potential cuts to the Future Combat System, contactors engaged in a massive public relations campaign. The goal was the protection of dollars for the Future Combat System Program as an entity and lawmakers were told of the industrial base for developing the Future Combat System program. This base spans 159 congressional districts over 35 states with 363 companies for material and approximately 7.000 jobs.[47] Clearly, the message was about congressional longevity vice national security and highlights the influence of yearly funding debates on defense appropriation. Despite the Army's efforts to program funds and develop a holistic approach for the Future Combat System, Congress mandated the procurement and timeframe for a piece of the Future Combat System program. As part of the FY2005 budget, Congress decreased the overall program's request by $324 million. However, it fully funded the request line for the program's Non Line-of-Sight Cannon and directed its fielding by 2010.[48] The danger of funding individual programs/selective components creates friction and prolongs the procurement of the entire system. In the end, 'finite' resources create a 'rob Peter

to pay Paul' mentality and continuous readjustment of a long-term strategy. While adjustment in any long term concept is inevitable, continuous and adequate funding is a matter of true commitment to the strategy.

Articulation of overall strategy beyond the procurement of hardware

There are other important issues associated with funding NCW capabilities. The remainder of this paper moves from the specific case of FCS to focus on the long-term objective: network centric warfare. With the infiltration of 'transformation' throughout the government, the Defense Department established the Office of Force Transformation to lead its efforts and development of a single strategy. It emphasized high-quality shared awareness, dispersed forces, speed of command, and flexibility in planning and execution across the full range of military operations.[49] While the change of culture plays a key attribute, there was a direct correlation with investment into new technologies, new organizational structures and increased emphasis on irregular warfare within the entire spectrum of conflict. The overall transformation vision highlights greater reliance on joint operations, effects-based operations, speed and agility and the precision application of power.[50]

As such, each military service produced roadmaps to transformation based on joint capabilities, consideration for service-related force structure, major acquisition programs, doctrine changes and training challenges. While the overall concept of network centric operations extends beyond the acquiring of technology or the network, this 'albatross', better stated myth, remains a key misnomer for most people outside the transformation bandwagon.[51] Network centric warfare applies to the holistic view of an organization. Harnessing the power of information, network centric warfare provides for a new conceptual framework to explore military missions, operations and organizations.[52] In simple terms, it requires adopting a new way of thinking and applying it toward military operations. Also, this reflected the way the Department funds, procures and fields combat capability programs. As with the multiple components of the Future Combat System, the interdependent strategies of the military services and their respective program require more than synchronization across the Department of Defense for a realistic implementation of transformational capabilities.

The Defense Department's Office of Force Transformation must engage in fermenting a detailed plan toward achieving the 'bumper sticker slogans' of network centric operations. This includes a public campaign of educating Congress, the Department of Defense and the defense industry on the intra-dependencies of implementing the network centric warfare strategy. Currently, the Department of the Navy, which includes the Marine Corps, seeks transformation

under the conceptual framework called Sea Power 21. The key elements of transformation include operating in littoral waters, expeditionary operations and new kinds of naval formations for independent operations on the sea.[53] Whereas, the Air Force transformation activities pursue technologies to "engender new operational concepts, to dominate air, space, and cyberspace."[54] Along with the Army, these military departments must seek a common transformational approach. Beyond the focus of hardware procurement, the plan must address force structure, organizational designs, doctrine and leverage an effective joint solution. That is a solution with widespread understanding from the Defense Department, Congress and the defense industry.

Without infringement on the constitutional powers of the Executive and Legislative Branches, both must participate in the formulation of the strategy. Simply, the Executive Branch should staff this draft document with key members of the Congress and the appropriate congressional committees. The action can follow similar protocols as for the nomination of judges to the Supreme Court. In doing this, the buy-in of the strategy increases the likelihood of the next phase- funding. Network centric warfare is about transforming the status quo. Without the full long-term support of Congress and their appropriation of resources, the 'vision' of military transformation remains a dream- not reality.

Conclusion

Although the strategic direction and the transformation term suggest new ways of doing business; many of the old monolithic ways have new coats of paint on them. True transformation demands significant changes throughout the culture and extends beyond the procurement of things for military forces. Military transformation- especially, network-centric operations, remains an open issue and competes with other national security initiative and domestic programs. The Executive and Legislative Branches must develop a spirit of cooperation for ensuring the security of this nation. Transformation must start at the very top of government. If not, this yearly process of funding impedes the idealistic goals of military transformation. Long term strategy requires both long-term commitment and funding coupled with a change in culture. After all, the primary goal is a unifying plan to accommodate the military's transformation objectives in support of the National Security Strategy. While seeking to deal with two separate but adjoining conquests of near and far term objectives, transformation seeks the long-term view of investment with near-term scarce resources.

As noted with the 2001 Quadrennial Defense Review[55], the administration's defense plan remained similar to previous efforts without the concept of transformation and a few new

initiatives. In other words, the main portions of the 2001 plan focused on on-going acquisition of traditional weapons programs (such as tactical fighters, artillery systems and aircraft carriers).[56] This created conflict across the military departments in establishing priorities and developing realistic cost estimates for transformation initiatives. As with the Future Combat System, the jury is still out on the cost for network centric warfare. The answer lies in the ability to embrace three essential elements: 1) Funding strategy based on the systems approach- Portfolio Management; 2) Total buy-in of the system-of-system strategy from internal and external elements and 3) Articulation of the overall strategy beyond the procurement of hardware.

While military transformation potentially gained more recognition and overcame the former concept of only modernization. It remains a disjointed implementation of the overall vision. As stated in the beginning of this paper, the Defense Departments must move beyond the synchronization of independent programs with roadmaps into a central strategy of one roadmap. The Department must ensure a consistent and realistic articulation of the strategy for network centric warfare. This enables unity of effort and solidifies the buy-in of a single strategy- not multiple roadmaps. Additionally, this reduces the conflict of unintended consequences between interdependent programs during any funding cycle. The result is a funding strategy based on portfolio management. Any modification of the strategy should conclude with the necessary adjustments for the entire strategy- not single program.

While noting the current operational threats and the continuous process for transformation of the military, the recent release of the 2006 Quadrennial Defense Review[57] avoids any significant shifts in the Department's funding strategy or major acquisition programs. In unambiguous terms, the report states "The QDR is not a programmatic or budget document. Instead, it reflects the thinking of the senior civilian and the military leaders…".[58] The ability to deliver transformational capabilities remain one of high optimism and expectations; despite, the evidence of delays, funding shortfalls and immaturity of critical technology found in numerous core programs or systems-of-systems. At this point, the price tag factor remains the most challenging factor to the transformation paradigm. The current funding strategy creates significant hurdles in reaching the end state and requires a transformational approach- as with the Future Combat System. Without a change in funding strategy, network centric warfare will lose it momentum and suffer many programs cuts, which lead down the road of termination.

Endnotes

[1] David S. Alberts, John J. Garstka, and Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2nd ed. (Washington, D.C.: U.S. Department of Defense Command and Control Research Program, 2002), 5.

[2] For additional information see Director, Office of Force Transformation, Office of the Secretary of Defense, *Elements of Defense Transformation* (Washington, D.C.: U.S. Department of Defense, Office of Force Transformation, October 2004).

[3] Arthur K. Cebrowski, *Military Transformation: A Strategic Approach* (Washington, D.C.: U.S. Department of Defense, Office of Force Transformation, 2003), 8.

[4] George Bush, *The National Security Strategy of the United States of America* (Washington, D.C.: The White House, September 2002), 29.

[5] Arthur K. Cebrowski, *What Is Transformation?* (Washington, D.C.: U.S. Department of Defense, Office of Force Transformation), available from http://www.oft.osd.mil/ what_is_transformation.cfm ; Internet; accessed 16 December 2005.

[6] Jason Sherman, "Army Defends Future Combat System," *InsideDefense.com* ,8 December 2005; available from http://InsideDefense.com; Internet; accessed 16 December 2005.

[7]Paul L. Francis, "Issues Facing the Army's Future Combat Systems Program," cover letter to briefing for Subcommittee on Tactical Air and Land Forces, Washington, D.C., United States General Accounting Office, 13 August 2003.

[8] Institute for Defense Analyses, *The Cost of Transformational Forces: A Case Study of the Army Future Combat Systems (FCS)* (Alexandria, VA: Institute for Defense Analyses, 2005), 1.

[9] Andrew Feickert, "The Joint Army's Future Combat System (FCS): Background and Issues for Congress," *Congressional Research Issue Brief for Congress*, 28 April 2005.

[10] Jeff Cotton, "FCS Program Rolls Forward," *COTS Journal, a*vailable from http://cots journalonline.com; Internet; accessed 1 November 2005.

[11] For background information see U.S. Department of the Army, *The United States Army Objective Force Operational and Organizational Plan, Maneuver Unit of Action*, TRADOC Pamphlet 525-3-90 (Fort Monroe: U.S. Army Training and Doctrine Command, 30 June 2003).

[12] Institute for Defense Analyses, 1-2.

[13] U.S. Department of the Army, Unit of Action Maneuver Battle Lab, *Operational Requirements Document (ORD) for the Future Combat Systems* (Washington, D.C.: April 2003).

[14] "These pulses are fast forays into enemy territory. Mission pulses vary in length from 72 to 168 hours, depending on the intensity of combat expected." Institute for Defense Analyses, 2.

[15] Ibid., 5-9.

[16] Ibid., 33-34.

[17] Larry D. Welch, Chairman of the Independent Assessment Panel, "Review of the Army's Objective Force and Future Combat System (FCS) Components: Independent Assessment Panel," April 2003 (draft), p.8; quoted in Institute for Defense Analyses, *The Cost of Transformational Forces: A Case Study of the Army Future Combat Systems (FCS)* (Alexandria, VA: Institute for Defense Analyses, 2005), 35.

[18] Institute for Defense Analyses, 37.

[19] Barry Boehm, *Software Engineering Economics* (New York: Prentice-Hall, 1981); quoted in Institute for Defense Analyses, *The Cost of Transformational Forces: A Case Study of the Army Future Combat Systems (FCS)* (Alexandria, VA: Institute for Defense Analyses, 2005), 35.

[20] Ibid., 36.

[21] Ibid., 50.

[22] Congressional Research Service, *Army Transformation and Modernization: Overview and Issues for Congress* (The Library of Congress), updated 24 January 2003, 5.

[23] Assessment reflects the author's personal views during assignments in the Pentagon [Office of the Secretary of Defense (1997 – 1999); Department of the Army (1999 – 2001) and Joint Staff (2003 – 2005)].

[24] "Army Will spend $14.7 Billion for Digital Division, Corps," *C4I News* 5 (4 June 1998): 1 [database on-line]; available from ProQuest; accessed 26 January 2006.

[25] U.S. Army, *Department of the Army Strategic Guidance 2004* (Washington, D.C.: U.S. Department of the Army, 2004).

[26] Ibid., 1.

[27] Mr. Walter R. Cooper, Office of the Secretary of Defense/Program Analysis and Evaluation Directorate, personal interview by author, 13 January 2006.

[28] White House Press Release (Washington, D.C.: The White House, 19 September 2001).

[29] Cebrowski, *Military Transformation: A Strategic Approach*, 5.

[30] Assessment reflects the author's personal assessment during assignments in the Pentagon [Office of the Secretary of Defense (1997 – 1999); Department of the Army (1999 – 2001) and Joint Staff (2003 – 2005)].

[31] Sherman.

[32] *Department of the Army Strategic Guidance 2005*, 9.

[33] General Peter Schoomaker, United States Army, Speech on 11 April 2005 (Future of the United States Army) to the American Enterprise Institute for Public Policy Research, available

from http://www.aei.org/events/filter.all,eventID.1011/transcript.asp.; Internet; accessed 16 December 2005.

[34] U.S. Department of Defense, "FY06 Budget Priorities Spiral Acquisition," (Washington, D.C.: Office of the Secretary of Defense, 2006 Discretionary Budget Authority).

[35] Peter M. Senge, *The Fifth Discipline: The Art & Practice of The Learning Organization* (New York: Currency Doubleday, 1990), 92.

[36] *The Constitution of the United States of America*, Article 1, Section 8.

[37] Sam C. Sarkesian, John Allen Williams, and Stephen J. Cimbala, *U.S. National Security: Policymakers, Processes and Politics*, 3rd ed. (Boulder, CO: Lynne Rienner Publishers, Inc., 2002), 20-21.

[38] 37th Annual DoD Cost Analysis Symposium, "DoD's Planning, Programming and Budgeting System (PPBS): A Historical Perspective," briefing slides (Washington, D.C., Office of the Secretary of Defense/Program, Analysis and Evaluation, n.d.).

[39] Bush, 29-30.

[40] Congressional Research Service, *Army Transformation and Modernization: Overview and Issues for Congress* (The Library of Congress), updated 24 January 2003, 2.

[41] For additional information on PPBES see Harold Lord, "Army Planning, Programming, Budgeting, and Execution Process," in *How the Army Runs: A Senior Leader Reference Handbook 2005-2006* (Carlisle, PA: U.S. Army War College, 2005), 131.

[42] U.S. Department of Defense, The Budget for Fiscal Year 2006, 90.

[43] For the purpose of this paper the modified definition of portfolio management is "management of selected grouping of investments using strategic planning, architectures and outcome-based performance measures to achieve a mission capability." For specific example see U.S. Department of Defense, *Information Technology Portfolio Management*, Department of Defense Directive 8115.01 (Washington, D.C.: U.S. Department of Defense, 10 October 2005).

[44] Ibid.

[45] Catherine MacRae Hockmuth, "FCS Contractors Step Up Advocacy Campaign," *InsideDefense.com*, 14 December 2005, available from http://InsideDefense.com; Internet; accessed16 December 2005.

[46] Cotton.

[47] Hockmuth.

[48] House Report 4613, Department of Defense Appropriations Act for FY 2005, updated 6 August 2004; available from www.gop.gov/committeecentral/bills/hr4613.asp; Internet; accessed 16 December 2005.

[49] Cebrowski, *Military Transformation: A Strategic Approach*, 28.

[50] Congressional Research Service, *Defense Transformation: Background and Oversight Issues for Congress* (The Library of Congress), updated 4 April 2005, i.

[51] Alberts, 5.

[52] Ibid., 87-88.

[53] Congressional Research Service, Naval *Transformation and Modernization: Overview and Issues for Congress* (The Library of Congress), updated 2 June 2005, 1.

[54] Congressional Research Service, *Air Force Transformation* (The Library of Congress), updated 25 January 2005, 3.

[55] U.S. Department of Defense, *Quadrennial Defense Review Report* (Washington, D.C.: U.S. Department of Defense, 2001).

[56] Steven M. Kosiak, *Analysis of the FY 2003 Defense Budget Request* (Washington, D.C.: Center for Strategic and Budgetary Assessment), 2.

[57] U.S. Department of Defense, *Quadrennial Defense Review Report* (Washington, D.C.: U.S. Department of Defense, 6 February 2006).

[58] Ibid., vi.